

[0070] In non-limiting example shown in FIG. 7, drive layer 206 of input structure 200 may be disposed over and coupled to a portion of base portion 106 of electronic device 100. Drive layer 206, as shown in FIG. 7, may be coupled to base portion 106 of electronic device 100 at each corner of drive layer 206. Adhesive 230 may be used to couple drive layer 206 to base portion 106. Similar to FIG. 6, in the example shown in FIG. 7, stack-up of input structure 200 may be supported by base portion 106 of casing 102 of electronic device 100. By coupling drive layer 206 to base portion 106 only at the corners of drive layer 206, the material used for coupling input structure 200 within casing 102 may be reduced. Additionally, by coupling drive layer 206 to base portion 106 only at the corners of drive layer 206, sense layer 204 and compliant layer 208 may have increased deflection when a user provides an input to electronic device 100 by applying a force. The increase deflection may ensure electronic device 100 receives the input provided by the user. Although shown in FIG. 7 as utilizing adhesive 230 to couple drive layer 206 to base portion 106, it is understood that other suitable coupling and/or bonding components may be used. In non-limiting examples, drive layer 206 may be coupled to base portion 106 using tape, lamination and so on.

[0071] As discussed herein, sense layer 204 and drive layer 206 of input structure 200 may capacitively detect a force (F) resulting from a user input. FIG. 8 shows a portion of sense layer 204, drive layer 206 and compliant layer 208 positioned therebetween. In the non-limiting example shown in FIG. 8, sense layer 204 may be formed from an array of sensor pixels 232, and drive layer 206 may be formed from an array of drive pixels 234. "Pixel," as used herein, does not necessarily refer to a pixel of a display device (e.g., an independently illuminable region of a display) but instead to a discrete electrode or other discrete electrical element that forms a portion of a sensor or sensing area.

[0072] Each sensor pixel 232 of sense layer 204 may correspond to a single drive pixel 234 of drive layer 206, where the corresponding pixels of sense layer 204 and drive layer 206 may be aligned and positioned on opposite sides of compliant layer 208. Thus, each pair of sense and drive pixels may be considered a capacitor. As shown in the non-limiting example embodiment, sensor pixels 232 and drive pixels 234 may be aligned within the respective layer and may be positioned and/or coupled directly to compliant layer 208. In another non-limiting example, sensor pixels 232 of sense layer 204 and drive pixels 234 of drive layer 206 may be coupled to a substrate (not shown) for positioning the electrodes on a separate and distinct layer of input structure 200. As discussed herein, a single sensor pixel 232 and corresponding drive pixel 234 may be used by a single input component or button of input structure 200, or an array of sensor pixels 232 and corresponding drive pixels 234 may be used by a single input component or button. The change in capacitance may be detected when the distance between the sensor pixels 232 and drive pixels 234 varies as a result of deformation in the contact portion 104. The change in capacitance may indicate a force applied by a user providing an input to electronic device 100. Additionally, a location in which the change in capacitance occurs may indicate the location of the force applied by the user. That is, embodiments described herein may localize a force by determining a pair of pixels underlying or otherwise corresponding to a location at which the force is applied, for example because the change in capacitance is greatest at that intersection. Thus, embodi-

ments described herein may sense not only force but also a location at which a force is applied and thus, a location of a touch or force. In yet another embodiment, only one layer or array of pixels may be used; the pixels may be mutually capacitive with respect to adjacent pixels. Changes in this mutual capacitance may be used to detect either or both of a location and amount of force, as described above.

[0073] In another non-limiting example, as shown in FIG. 9, sense layer 204 may be formed from multiple sensor capacitive columns 236 arranged in a first direction. Additionally in the non-limiting example, drive layer 206 may be formed from multiple drive capacitive rows 238 arranged in a second direction, distinct from the first direction. Although not shown, the respective capacitive columns 236 and capacitive rows 238 forming sense layer 204 and drive layer 206 of input structure 200 may be separated by compliant layer 208, as discussed herein. When sense layer 204 utilizes sensor capacitive columns 236, and drive layer 206 is formed from drive capacitive rows 238, a change in capacitance at an intersection of sensor capacitive columns 236 and drive capacitive rows 238 may indicate a force applied by a user providing an input to electronic device 100. To detect the change in capacitance at an intersection, a charge or current may be repeatedly provided through each of sensor capacitive columns 236 or drive capacitive rows 238 in a predetermined sequence. When a detected capacitance varies from a steady or uncompressed state capacitance, the location and/or amount of the force applied to sense layer 204 may be detected. A location of touch may be determined in a similar fashion to that previously described with respect to FIG. 8; e.g., by determining a location corresponding to an intersection of a drive row and sense column experiencing or reporting a greatest change in capacitance.

[0074] FIG. 10 shows a top view of electronic device 100 including input structure 200. As shown in FIG. 10 and discussed herein with respect to FIGS. 2 and 3, casing 102 may have a group of micro-perforations or holes 220 (shown in phantom) formed through contact portion 104. In the non-limiting example, holes 220 may be formed through contact portion 104 in predetermined input areas 202a, 202b, 202c, 202d of electronic device 100. Each of the input areas 202a, 202b, 202c, 202d may include a group of holes 220. Additionally, and as discussed herein, input areas 202a, 202b, 202c, 202d, when configured, may have boundaries defined by illuminated holes 220. Although shown as being arranged in a grid geometry, it is understood that the group of holes 220 formed through contact portion 104 may be positioned in any geometry or configuration within contact portion 104. Additionally, it is understood that holes 220 may be formed over the entire surface of contact portion 104; however, only those holes 220 formed in input areas 202a, 202b, 202c, 202d may be visible by a user when a light is provided by light guide layer 218 and/or light source 222, as discussed herein.

[0075] FIG. 11 shows a top view of electronic device 100 and input structure 200 configured as specific input areas corresponding to particular input devices or structures. As shown in FIG. 11, and with continued reference to FIG. 10, input areas 202a, 202c, 202d (see, FIG. 10) may be configured to be interacted with by a user of electronic device 100, where each input area 202a, 202c, 202d is configured as a distinct input device. Input area 202b (see, FIG. 10) may not be configured as an input device, and therefore may be deactivated or selectively inoperable for electronic device 100. Further, each of the input areas may be different, unique parts